

Candidate Name	Centre Number	Candidate Number

WELSH JOINT EDUCATION COMMITTEE
General Certificate of Education
Advanced Subsidiary/Advanced



CYD-BWYLLGOR ADDYSG CYMRU
Tystysgrif Addysg Gyffredinol
Uwch Gyfrannol/Uwch

312/01

BIOLOGY

MODULE B12

A.M. MONDAY, 6 June 2005

(1 hour 30 minutes)

For Examiner's Use Only

Total Marks	
------------------------	--

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

The quality of written communication will affect the awarding of marks.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

1. Give the names of the following:

(a) The sheet of muscle used in breathing that separates the thorax from the abdomen. [1]

.....

(b) The process by which carbon dioxide passes from the blood to the air space of the alveoli. [1]

.....

(c) The disease caused by the breaking down of the walls of the alveoli. [1]

.....

(d) The disease involving muscular spasms and constriction of the bronchioles. [1]

.....

(e) The volume of air passed in and out of the lungs during one breath. [1]

.....

(Total 5 marks)

2. The surface area and volume of a unicellular organism, such as *Amoeba proteus*, was calculated for organisms each with a different radius. The surface area to volume ratio was determined, as shown in the table below.

<i>Radius of Amoeba proteus/arbitrary units</i>	<i>Surface area of Amoeba proteus/arbitrary units</i>	<i>Volume of Amoeba proteus/arbitrary units</i>	<i>Ratio of surface area to volume</i>
1	12	4	3:1
3	108	108	
4	192	256	

(a) Complete the table above giving the surface area to volume ratios for *Amoeba proteus* cells with radii of 3 and 4 arbitrary units. [2]

- (b) With reference to the table, explain why a small unicellular organism, such as *Amoeba proteus* does not require a specialised gaseous exchange surface, but larger multicellular organisms do require an exchange surface. [3]

.....

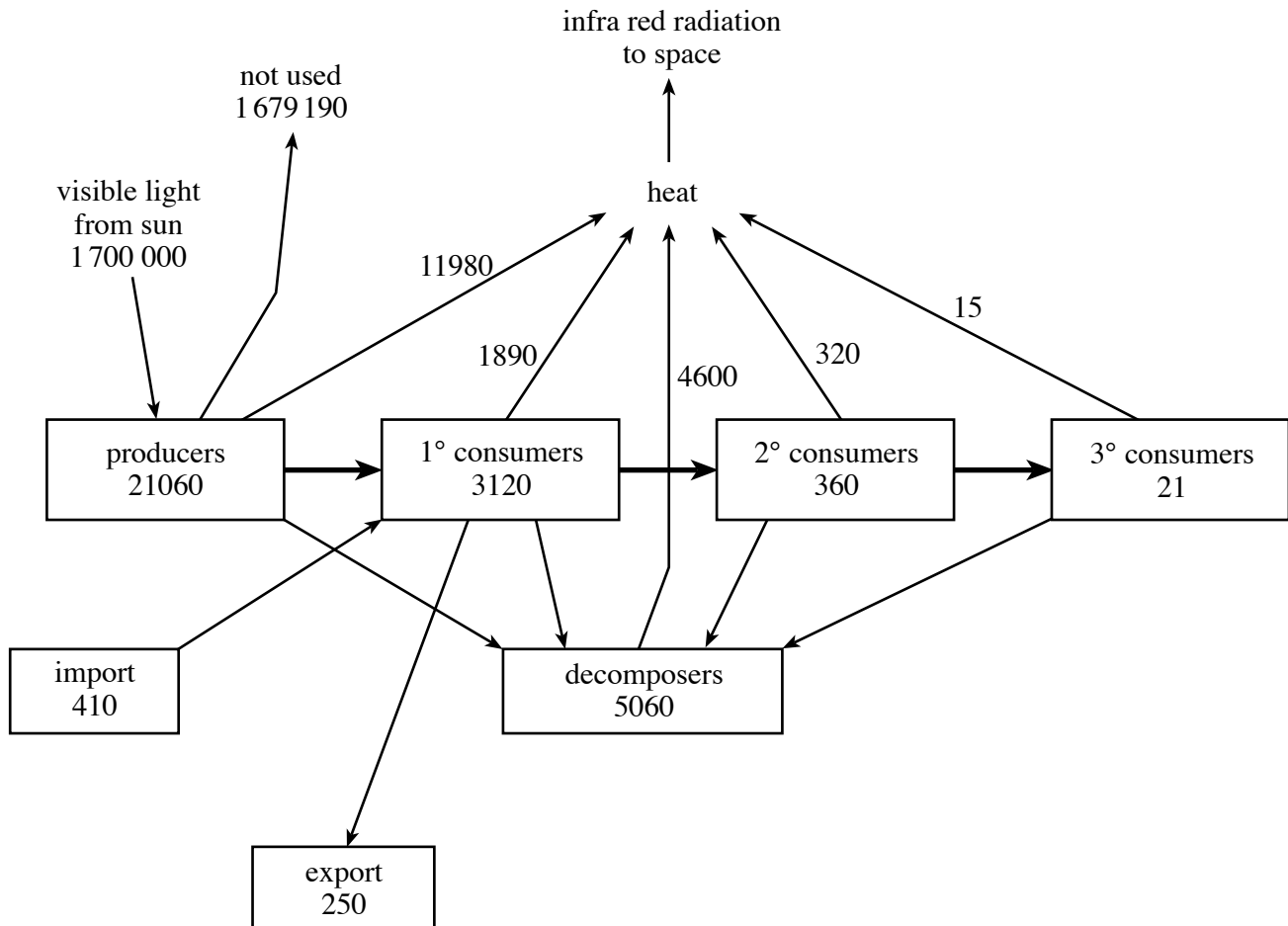
.....

.....

.....

(Total 5 marks)

3. The diagram below shows the energy input, output and the amount of energy present at each trophic level of an **aquatic** ecosystem. The figures represent the amount of energy per square metre, over a year.



- (a) (i) Calculate the percentage of energy from the sun, converted by the producers during photosynthesis. Show your working. [2]

.....

.....

- (ii) Give **three** reasons why most of the energy from the sun (1 679 190) is 'not used'. [3]

.....

.....

.....

.....

(b) (i) How many trophic levels are shown in this ecosystem? [1]

.....

(ii) Using the data, explain why a further trophic level is not possible in this ecosystem. [2]

.....

.....

(c) Energy is 'lost' from the producers and consumers in the form of heat. Give **two other** ways in which some of the energy is 'lost'. [2]

.....

.....

(d) Name **two** types of organism that would be described as *decomposers*. [2]

.....

.....

(e) This ecosystem is a small lake, suggest how energy may be *exported*. [1]

.....

.....

(Total 13 marks)

4. The table below shows the soil characteristics as measured in 1994 and 1997 of an area of woodland in Wales. In 1995 the trees were cut down and removed.

<i>Soil characteristic</i>	<i>1994</i>	<i>1997</i>
Mean daytime soil temperature/°C	9.1	11.5
Soil moisture content/%	32.0	21.0
Soil nitrogen/mg kg ⁻¹	13.6	2.2
Soil potassium/mg kg ⁻¹	11.0	1.9
Soil calcium/mg kg ⁻¹	15.3	4.8
pH	7.4	6.9

- (a) Describe and explain the effect of clearing the woodland on the soil nutrient content. [3]

.....

.....

.....

.....

- (b) How could the information in the table be used to justify the prediction that the rate of decomposition in the soil, after clearance, will be increased? [2]

.....

.....

.....

(Total 5 marks)

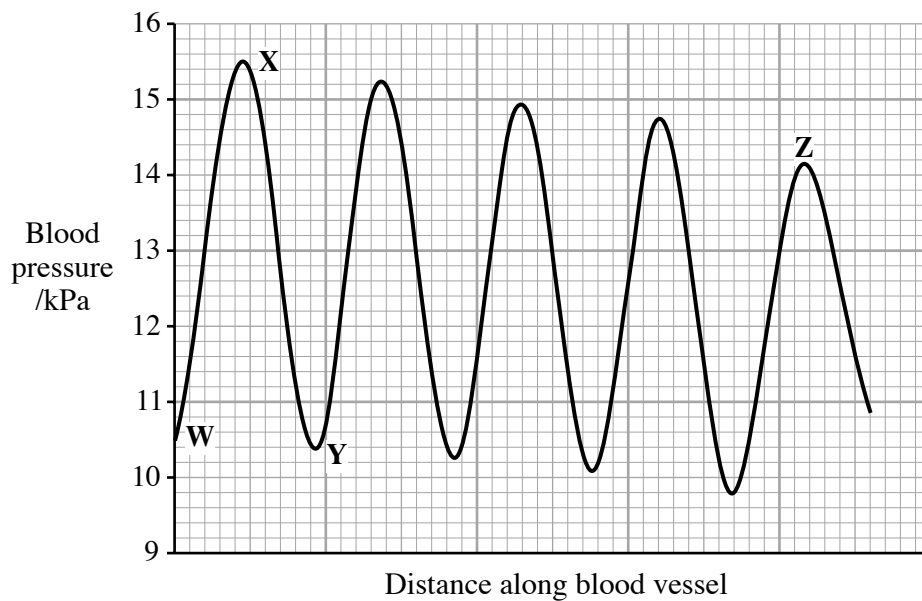
BLANK PAGE

5. (a) Give **three structural** differences between arteries and veins.

[3]

	Artery	Vein
1		
2		
3		

- (b) The diagram below shows the pressure in a blood vessel at various points along its length.



- (i) Name the **type** of blood vessel in which the measurements would have been made. [1]

.....

- (ii) What is the difference in blood pressure between **W** and **X**? [1]

.....

- (iii) What causes the increase in pressure between **W** and **X**? [1]

.....

(iv) Explain the fall in blood pressure between **X** and **Y**.

[1]

.....

.....

(v) Suggest why there is a decrease in the overall **maximum** pressure between **X** and **Z**.

[2]

.....

.....

(c) (i) State what is meant by the term *double circulatory system*.

[2]

.....

.....

.....

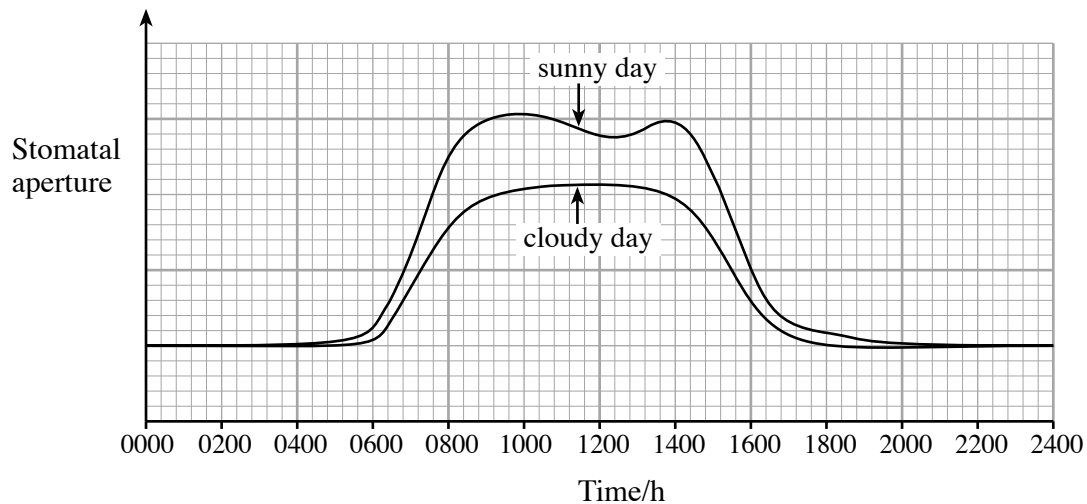
(ii) State what is meant by the term *closed circulatory system*.

[1]

.....

(Total 12 marks)

6. The graph below shows the changes in the size of stomatal pores (stomatal aperture) over a 24 hour period.



- (a) (i) There is a dip in the graph in the middle of a sunny day.

Describe and explain **two other** differences between the patterns of stomatal opening for a sunny day and a cloudy day. [4]

Difference 1

Explanation

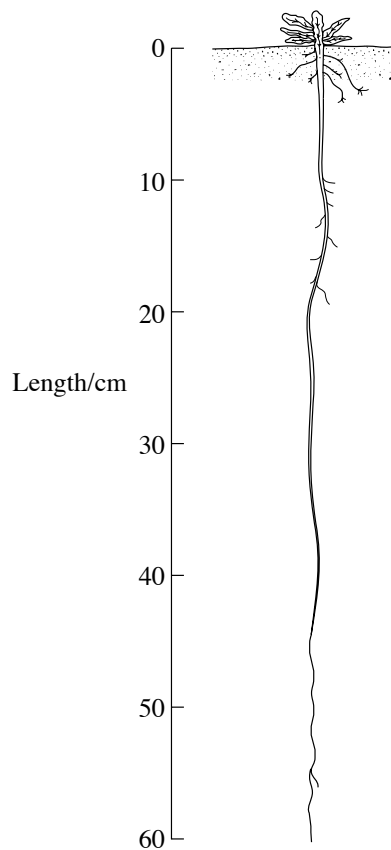
Difference 2

Explanation

- (ii) Suggest a reason for the dip in the graph in the middle of a sunny day. [1]

.....

- (b) The diagram shows a plant, *Hypochoeris radicata* which grows extensively in sand dunes.



- (i) What is the general name given to a plant that grows in dry conditions? [1]

.....

- (ii) Describe **two** features shown in the diagram that enable the plant to grow successfully on a dry sand dune and explain how the feature helps. [4]

Feature

.....

Explanation

.....

Feature

.....

Explanation

.....

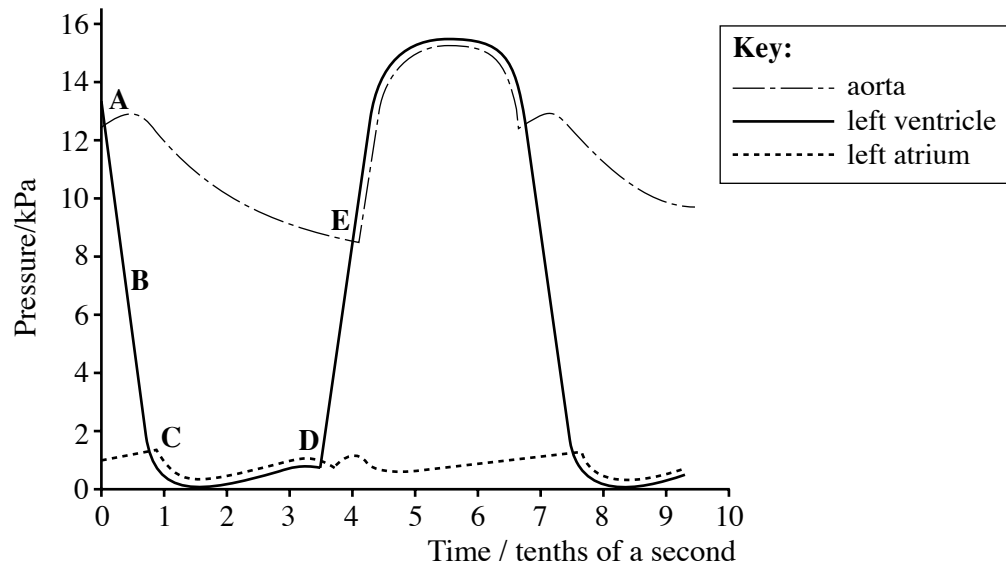
- (iii) Give **two other** structural features that are shown by plants that grow in dry conditions. [2]

.....

.....

(Total 12 marks)
Turn over.

7. The graph shows changes in the pressure of blood in the left ventricle and aorta of a mammal during one complete cardiac cycle.



- (a) Using the letters **A-E** as given on the graph state:

- (i) the point at which the aortic valve is opened;

[1]

.....

- (ii) the period during which the bicuspid (atrio-ventricular valve) is open.

[1]

.....

- (b) Explain the changes that occur in the **volume** of blood in the left ventricle after point **E**. [2]

.....

- (c) (i) Mark on the graph by means of an arrow labelled **X**, the point at which the aortic valve closes. [1]

- (ii) Explain what causes the closing of the aortic valve. [2]

.....

- (d) Give the **name** of the area of the heart where the heart beat is initiated. [1]

.....

(Total 8 Marks)

Any diagrams included in your answer must be fully annotated.

(ii) Outline the limitations of this hypothesis. [2]

Or *(b)* Describe the factors that control the size of a population. [10]

This image shows a full page of a document template. It consists of approximately 28 evenly spaced horizontal dotted lines across the entire width of the page, providing a guide for handwriting or typing. There are no margins, text, or other markings present.

[illegible]

(0006/15)